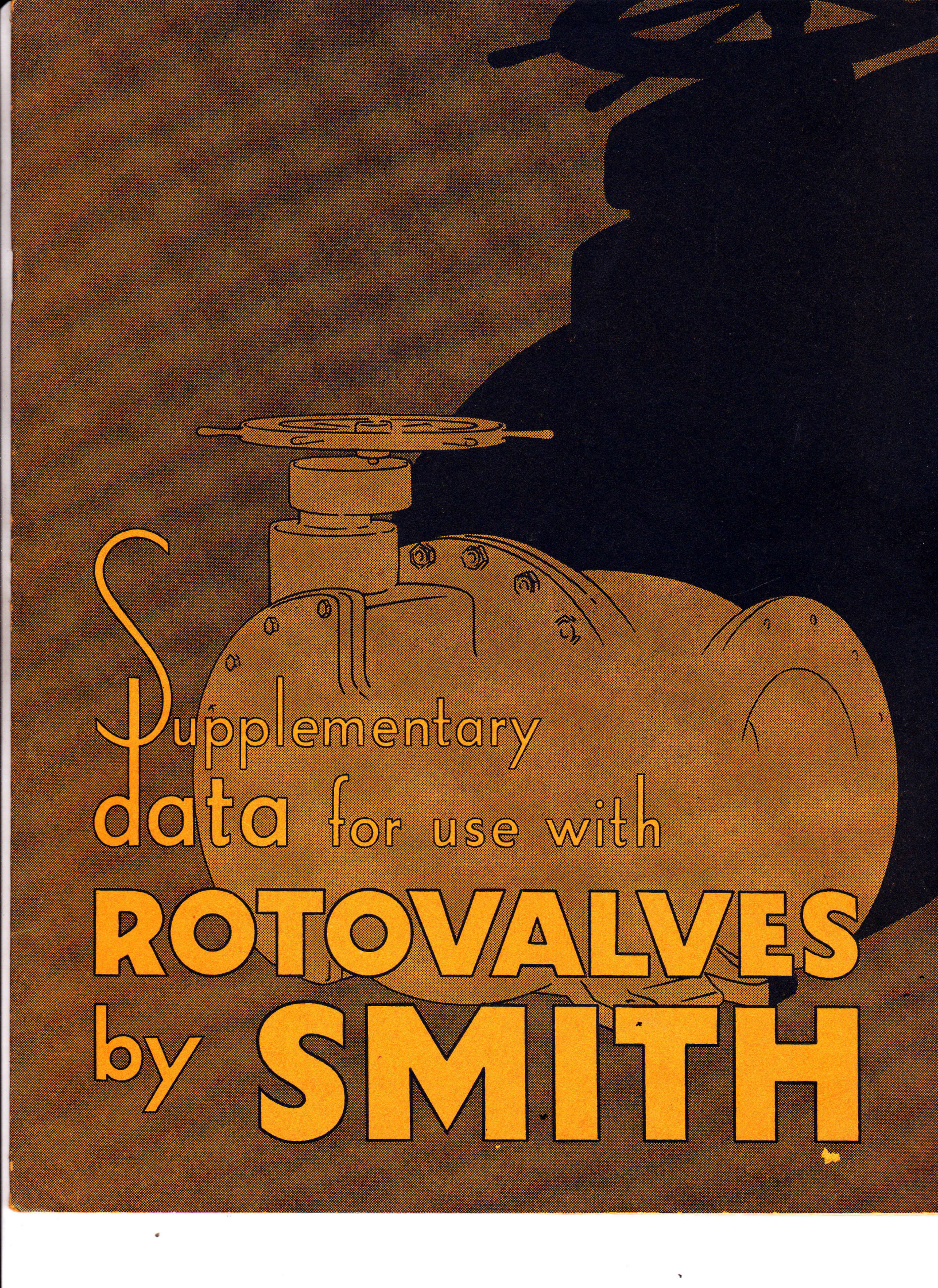

Supplementary data for use with ROTOVALVES by SMITH

BULLETIN No. 143

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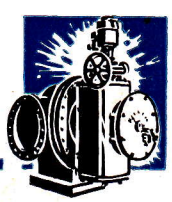
Preface to Supplementary Data For use with ROTOVALVES by Smith

THE mounting popularity of ROTOVALVES, and their increasing use in various fields of fluid control, have created a demand for tabular matter and other data, which would assist both present and prospective users.

This Bulletin presents essential data, new mechanical principles and products to meet the existing need.



Developments

SINCE "Rotovalves by Smith," Bulletin 140, was placed in general circulation, considerable questioning and differences in opinion have arisen, in the matter of the selection and choice of Cone Valves.

It is common practice to use cone valves much smaller than the size of the pipe line, in which they are placed. The losses resulting from reducing the sizes of these valves in this manner are similar to those encountered in a venturi tube of similar dimensions. The throat velocities frequently are as high or higher than 35 feet per second through the cone valve proper.

Occasionally extensive calculations are required in the matter of determining losses. To make computations of losses simpler and easier, we have compiled a number of tables in accordance with the methods set forth on the next two pages, 4 and 5, taken from our previous Bulletin 140.

The tables, on pages 6 to 13 inclusive, are based upon velocities in the main line.

The examples appearing on page 6 are all solutions of the same problem and explain themselves.

It should be noted that losses through steel taper sections are less than through A.W.W.A. sections for equal sizes and lengths. This is explained by the fact that the steel sections are tapered full length, whereas the A.W.W.A. sections are tapered only part of their lengths.

While the tables show net differences in losses between gate and cone valve installations, this does not mean that it is the best practice to choose a cone valve installation which has less loss than a gate valve installation.

In any system, where increased loss of head does not work a hardship, smaller valves may be installed without impairing the installation in any way whatever—and at appreciable savings in initial cost.

S. MORGAN SMITH COMPANY

Rotovalves Versus Gate Valves

THE same general principles apply to stop valve installations as apply to pressure reducing, pressure relief or flow control valves with regards to size versus flow.

In Bulletin No. 140, illustrations of this relationship with respect to pressure reducing valves will be found. However, there are many times when head loss is of no importance and still greater reductions in size can be made with corresponding reductions in initial cost.

With the recent development in the design of the operating heads of ROTOVALVES, whereby they can be completely enclosed and buried in the ground without the cost of building vaults, it becomes still more practical and economical to use ROTOVALVES for shutoff purposes. This applies particularly to locations of importance such as intersections or other strategic points.

In making a decision as to the economic evaluation of one installation against another, a comparison of the head losses involved must be made.

Since the loss through a ROTOVALVE is less than that through a gate valve of the same size, it is feasible to substitute a much smaller size ROTOVALVE. In such a situation the cone valve would be placed in the throat of a venturi section.

The loss through the ROTOVALVE installation is composed of the following factors:

1. Loss through the reducing section (see page 6).
2. Loss through the ROTOVALVE (see page 16).
3. Loss through the increaser section (see page 6).

Experiments made and published by Prof. A. H. Gibson now of the University of Manchester in England show that in venturi sections contraction loss is negligible and that expansion loss accounts for the major portion of the total loss. It was further found that the loss was a function of the included angle of divergence. A coefficient of loss "C" was established for various angles.

C = .13 for 6° included angle
C = .15 for 8° included angle
C = .17 for 10° included angle
C = .21 for 13° included angle
C = .27 for 15° included angle
C = .42 for 20° included angle
C = .60 for 25° included angle
C = .80 for 30° included angle

As stated above the loss through the reducing section may be neglected for rough estimate. However, where more exact calculation is desired, this loss may be assumed to be equivalent to the friction loss through an equal length of straight pipe, the diameter of which is equal to the mean diameter of the reducing section. Prof. Gibson evolved the following formula for the determination of the loss in a diverging section. Wall friction was taken into account in establishing the coefficient "C".

$$\text{Loss} = \frac{C(V_{TH} - V_{EN})^2}{2g}$$

Where

V_{TH} = Velocity in f.p.s. at the venturi throat

V_{EN} = Velocity in f.p.s. at the venturi entrance

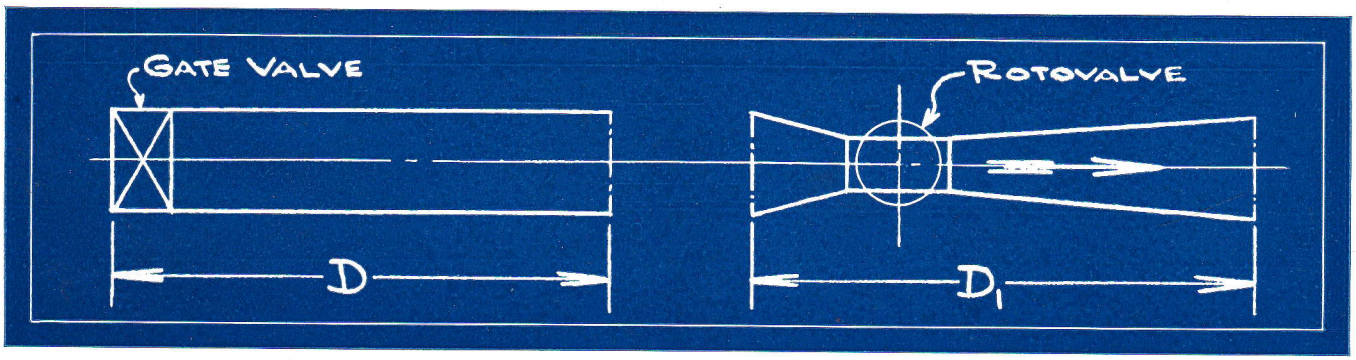
C = Loss coefficient

To the above result must be added the loss through the ROTOVALVE and through the converging section.

This total loss must be compared to the sum of the loss through the gate valve and through a length of straight pipe equal to the combined length of the venturi sections and the ROTOVALVE less the length of the gate valve.

Inasmuch as the difference in cost between a straight piece of pipe and a venturi section is not great, it is often advantageous where space will permit to use a small angle of divergence in the venturi. Eight degrees have generally proven satisfactory. Where space is limited the minimum size of the ROTOVALVE is determined by the divergence angle of the increaser. In regard to the angle of convergence of the reducing section, it has been found that 30 degrees is satisfactory.

In general, experience has shown that equal losses occur in a venturi assembly in which the diameter of the ROTOVALVE at its throat is seven-tenths the diameter of the gate valve with its proportionate length of straight pipe.



EXAMPLES

Q = 50 M.G.D. Compare a 42″ gate valve with a 30″ cone valve.

	42″ Gate Valve			30″ Cone Valve		
Gate Valve	Length = 2′-9″	Loss = .234′		Converging Sec.	Length = 2′-0″	Loss = .028′
Pipe	Length = 11′-7″	Loss = .076′		Cone Valve	Length = 5′-4″	Loss = .130′
Total	Length = 14′-4″	T. Loss = .310′		Diverging Sec.	Length = 7′-0″	Loss = .138′
				Total	Length = 14′-4″	T. Loss = .296′

Cone Valve Saves .014′

Q = 40 M.G.D. Compare a 36″ Gate Valve with a 24″ cone valve.

	36″ Gate Valve			24″ Cone Valve		
Gate Valve	Length = 2′-4″	Loss = .303′		Converging Sec.	Length = 2′-0″	Loss = .045′
Pipe	Length = 11′-4″	Loss = .104′		Cone Valve	Length = 4′-8″	Loss = .223′
Total	Length = 13′-8″	T. Loss = .407′		Diverging Sec.	Length = 7′-0″	Loss = .277′
				Total	Length = 13′-8″	T. Loss = .545′

Gate Valve Saves .138′

Table of Losses in A.W.W.A. Std. Reducers and Increasers at 10 F.P.S. in Large Diameter

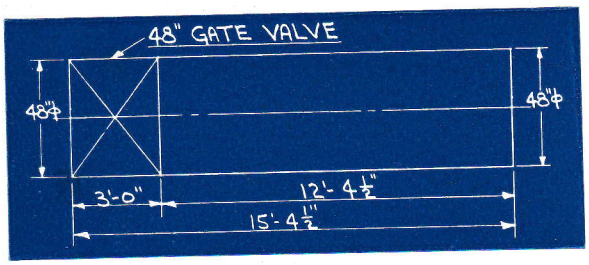
Size	Short Pattern			Long Pattern			Size	Short Pattern			Long Pattern			Size	Short Paterrn			Long Pattern		
	Leng.	Red.	Inc.	Leng.	Red.	Inc.		Leng.	Red.	Inc.	Leng.	Red.	Inc.		Leng.	Red.	Inc.	Leng.	Red.	Inc.
8″x 6″	1′-4″	.125	.150	2′- 2″	.203	.228	18″x14″	2′- 0″	.068	.125	2′-10″	.096	.112	30″x20″	2′-10″	.069	1.12	6′-2″	.150	.357
10″x 8″	1′-4″	.087	.100	2′- 2″	.141	.154	18″x12″	2′- 0″	.091	.785	2′-10″	.129	.523	30″x18″	2′-10″	.086	2.90	6′-2″	.187	.885
10″x 6″	1′-4″	.144	1.92	2′- 2″	.234	1.03	18″x10″	2′- 0″	.127	3.92	2′-10″	.180	2.72	30″x16″	2′-10″	.106	7.00	6′-2″	.231	2.03
12″x10″	1′-4″	.062	.070	2′- 2″	.101	.109	20″x18″	2′- 6″	.054	.056	3′- 4″	.072	.074	36″x30″	3′- 4″	.040	.058	6′-2″	.074	.082
12″x 8″	1′-4″	.098	.928	2′- 2″	.159	.500	20″x16″	2′- 6″	.070	.083	3′- 4″	.093	.106	36″x24″	3′- 4″	.068	1.07	6′-2″	.126	.428
12″x 6″	1′-4″	.164	8.96	2′- 2″	.266	5.46	20″x14″	2′- 6″	.091	.369	3′- 4″	.121	.302	36″x20″	3′- 4″	.092	5.12	6′-2″	.170	1.92
14″x12″	2′-0″	.070	.075	2′-10″	.099	.104	20″x12″	2′- 6″	.124	1.67	3′- 4″	.165	1.23	36″x18″	3′- 4″	.112	10.1	6′-2″	.207	3.92
14″x10″	2′-0″	.108	.273	2′-10″	.153	.216	20″x10″	2′- 6″	.172	6.58	3′-x4″	.229	4.90	42″x36″	3′- 4″	.036	.041	6′-2″	.067	.072
14″x 8″	2′-0″	.162	2.20	2′-10″	.229	1.47	24″x20″	2′- 6″	.050	.058	3′- 4″	.067	.075	42″x30″	3′- 4″	.050	.648	6′-2″	.092	.259
16″x14″	2′-0″	.057	.061	2′-10″	.081	.085	24″x18″	2′- 6″	.062	.207	3′- 4″	.083	.169	42″x24″	3′- 4″	.079	4.81	6′-2″	.146	1.87
16″x12″	2′-0″	.081	.178	2′-10″	.114	.141	24″x16″	2′- 6″	.081	.808	3′- 4″	.108	.594	48″x42″	3′- 4″	.036	.040	6′-2″	.067	.071
16″x10″	2′-0″	.120	1.24	2′-10″	.170	.826	24″x14″	2′- 6″	.107	2.78	3′- 4″	.142	2.07	48″x36″	3′- 4″	.047	.423	6′-2″	.087	.169
16″x 8″	2′-0″	.173	6.86	2′-10″	.245	4.76	24″x12″	2′- 6″	.135	8.26	3′- 4″	.180	6.30	48″x30″	3′- 4″	.065	2.71	6′-2″	.120	1.05
18″x16″	2′-0″	.050	.053	2′-10″	.071	.074	30″x24″	2′-10″	.049	.110	6′- 2″	.107	.120	48″x24″	3′- 4″	.097	12.6	6′-2″	.179	6.02

To Find Loss at Any Flow in M.G.D. — $V = 1.547 \times \frac{\text{M.G.D.}}{A} = \left(\frac{284 \times \text{M.G.D.}}{D^2}\right)$, A = Area of Pipe in Sq. Ft.
D = Diameter of Pipe in Inches

Loss = $0.01V^2 \times$ Loss at 10 F.P.S.

EXAMPLES:

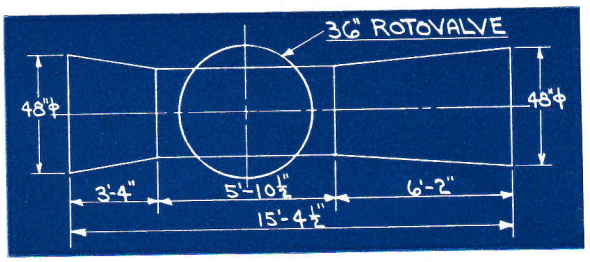
1.



48″ Dia. @ 10 F.P.S. = 81.2 M.G.D.

48″	Gate Valve Loss (See Page 17)	=	.317′
48″	Pipe Loss (W. & H. Coef. C = 120)	=	.074′
	Total Loss (Check Page 8)	=	.391′

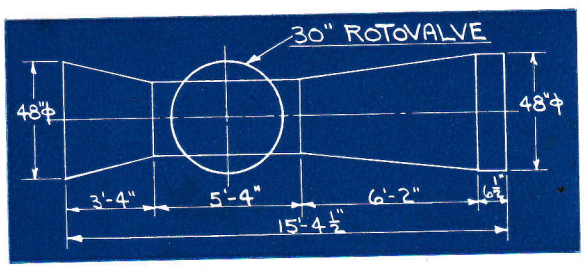
2.



48″ Dia. @ 10 F.P.S. = 81.2 M.G.D.

36″	Rotovalve Loss (See Page 16)	=	.144′
48″x36″	Reducer Loss (See Table above)	=	.047′
48″x36″	Increaser Loss (See Table above)	=	.169′
	Total Loss (Check Page 8)	=	.360′

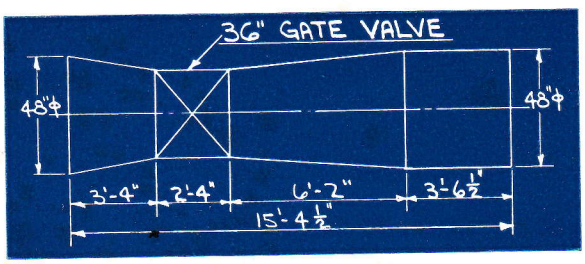
3.



48″ Dia. @ 10 F.P.S. = 81.2 M.G.D.

30″	Rotovalve Loss (See Page 16)	=	.315′
48″x30″	Reducer Loss (See Table above)	=	.065′
48″x30″	Increaser Loss (See Table above)	=	1.05′
	Pipe Loss (W. & H. Coef. C = 120)	=	.003′
	Total Loss	=	1.43′

4.



48″ Dia. @ 10 F.P.S. = 81.2 M.G.D.

36″	Gate Valve Loss (See Page 17)	=	1.27′
48″x36″	Reducer Loss (See Table above)	=	.047′
48″x36″	Increaser Loss (See Table above)	=	.169′
	Pipe Loss (W. & H. Coef. C = 120)	=	.021′
	Total Loss	=	1.51′

Size of Rotovalve Assembly	Laying Length		Net **SAVING** or **LOSS** for Rotovalve Assembly over Full Size Gate Valve Assembly Based on Pipe Line Velocities in F.P.S.											Comparative Example of Assembly Loss at 10 F.P.S.	
	125# Flg's.	250# Flg's.	4	5	6	7	8	9	10	11	12	13	14	Roto.	Gate
8x 6x 8	3'- 9⅛"	3'-10"	.008	.012	.018	.024	.031	.040	.049	.059	.071	.083	.096	.694	.743
10x 8x10	3'-11½"	4'- 0½"	.049	.077	.111	.151	.197	.249	.307	.372	.442	.519	.602	.391	.698
10x 6x10	3'-11⅛"	4'- 0"	.491	.766	1.11	1.51	1.97	2.49	3.07	3.72	4.42	5.19	6.02	3.77	.697
12x10x12	4'- 8⅛"	4'- 9½"	.063	.098	.141	.192	.251	.318	.392	.475	.564	.662	.768	.285	.677
12x 8x12	4'- 3½"	4'- 4½"	.146	.228	.329	.448	.584	.740	.914	1.10	1.31	1.54	1.79	1.58	.666
12x 6x12	4'- 3⅛"	4'- 4"	1.74	2.72	3.92	5.34	6.97	8.82	10.9	13.2	15.7	18.4	21.3	11.6	.664
14x12x14	5'- 3"	5'- 4½"	.069	.108	.156	.212	.277	.351	.433	.524	.624	.732	.848	.219	.652
14x10x14	5'- 0⅛"	5'- 1½"	.039	.061	.088	.120	.157	.199	.246	.297	.354	.415	.482	.892	.646
14x 8x14	4'- 7½"	4'- 8½"	.686	1.07	1.54	2.10	2.74	3.47	4.29	5.18	6.17	7.24	8.40	4.93	.636
16x14x16	5'-11½"	6'- 1"	.071	.111	.160	.218	.284	.360	.444	.538	.640	.750	.870	.186	.630
16x12x16	5'- 7"	5'- 8½"	.009	.014	.020	.027	.036	.045	.056	.068	.081	.095	.110	.566	.622
16x10x16	5'- 4⅛"	5'- 5½"	.307	.480	.690	.940	1.23	1.55	1.92	2.32	2.76	3.24	3.76	2.54	.617
16x 8x16	4'-11½"	5'- 0½"	1.69	2.65	3.81	5.19	6.78	8.58	10.6	12.8	15.2	17.9	2.08	11.2	.608
18x16x18	6'- 5"	6'- 7"	.070	.110	.158	.215	.281	.356	.439	.531	.632	.742	.860	.163	.602
18x14x18	6'- 1½"	6'- 3"	.028	.043	.062	.085	.111	.140	.173	.209	.249	.292	.339	.423	.596
18x12x18	5'- 9"	5'-10½"	.155	.243	.349	.475	.621	.786	.971	1.17	1.40	1.64	1.90	1.56	.589
18x10x18	5'- 6⅛"	5'- 7½"	.916	1.43	2.06	2.81	3.67	4.64	5.73	6.94	8.24	9.68	11.2	6.32	.585
20x18x20	6'- 9¾"	6'-11⅜"	.069	.107	.155	.210	.275	.348	.429	.519	.618	.725	.841	.145	.574
20x16x20	6'- 7"	6'- 9"	.038	.059	.085	.116	.151	.191	.236	.286	.340	.399	.463	.334	.570
20x14x20	6'- 3½"	6'- 5"	.085	.134	.192	.262	.342	.433	.535	.647	.770	.904	1.05	1.10	.565
20x12x20	5'-11"	6'- 0½"	.510	.797	1.15	1.56	2.04	2.58	3.19	3.86	4.59	5.39	6.24	3.75	.559
20x10x20	5'- 8⅛"	5'- 9½"	1.85	2.90	4.17	5.68	7.42	9.39	11.6	14.0	16.7	19.6	22.7	12.2	.555
24x20x24	7'-11"	8'- 0⅝"	.051	.079	.114	.154	.202	.255	.315	.381	.453	.532	.618	.234	.549
24x18x24	7'- 5¾"	7'- 7⅜"	.001	.002	.003	.004	.005	.006	.008	.010	.012	.014	.016	.551	.543
24x16x24	7'- 3"	7'- 5"	.166	.260	.374	.510	.666	.842	1.04	1.26	1.50	1.76	2.04	1.59	.540
24x14x24	6'-11½"	7'-11"	.630	.985	1.42	1.93	2.52	3.19	3.94	4.76	5.67	6.66	7.72	4.48	.536
24x12x24	6'- 7"	6'- 8½"	1.79	2.80	4.03	5.48	7.16	9.06	11.2	13.5	16.1	18.9	21.9	11.7	.531
30x24x30	9'- 8"	9'- 9¾"	.034	.054	.077	.105	.138	.174	.215	.260	.310	.363	.421	.297	.512
30x20x30	8'-11"	9'- 0⅝"	.163	.255	.367	.500	.653	.826	1.02	1.23	1.47	1.72	2.00	1.52	.504
30x18x30	8'- 5¾"	8'- 7⅜"	.481	.752	1.08	1.47	1.92	2.44	3.01	3.64	4.33	5.08	5.89	3.51	.500
30x16x30	8'- 3"	8'- 5"	1.18	1.85	2.66	3.62	4.73	5.99	7.40	8.95	10.6	12.5	14.5	7.90	.497
36x30x36	11'- 4"	11'- 5¾"	.044	.068	.098	.133	.174	.220	.272	.329	.392	.460	.533	.206	.478
36x24x36	10'- 8"	10'- 9¾"	.162	.252	.364	.495	.646	.818	1.01	1.22	1.45	1.71	1.98	1.48	.472
36x20x36	9'-11"	10'- 0⅝"	.886	1.38	1.99	2.71	3.54	4.48	5.54	6.70	7.97	9.36	10.8	6.01	.466
36x18x36	9'- 5¾"	9'- 7⅜"	1.69	2.65	3.81	5.19	6.78	8.58	10.6	12.8	15.2	17.9	20.8	11.1	.462
42x36x42	12'-10½"	13'- 2"	.045	.070	.100	.136	.178	.225	.278	.337	.400	.470	.545	.157	.435
42x30x42	12'- 4"	12'- 5¾"	.058	.090	.130	.177	.232	.293	.362	.438	.521	.612	.709	.793	.431
42x24x42	11'- 8"	11'- 9¾"	.707	1.10	1.59	2.16	2.83	3.58	4.42	5.34	6.36	7.46	8.66	4.85	.426
48x42x48	14'-11¼"	15'- 1⅜"	.039	.061	.088	.120	.157	.199	.245	.297	.353	.414	.480	.144	.389
48x36x48	13'-10½"	14'- 2"	.016	.025	.036	.049	.064	.081	.100	.121	.144	.169	.196	.482	.382
48x30x48	13'- 4"	13'- 5¾"	.333	.520	.727	1.02	1.33	1.68	2.08	2.51	2.99	3.51	4.07	2.46	.379
48x24x48	12'- 8"	12'- 9¾"	1.69	2.65	3.81	5.19	6.78	8.58	10.6	12.8	15.2	17.9	20.8	11.0	.375

The small diameter in each assembly indicates Rotovalve size. Loss or Saving Tables shown apply only to the 125# Flange Assemblies.

LOSSES BASED ON AMERICAN STANDARD REDUCER SECTIONS.

Size of Roto-Valve Assembly	Laying Length			Net **SAVING** or **LOSS** for Rotovalve Assembly over Full Size Gate Valve Assembly Based on Pipe Line Velocities in F.P.S.											Comparative Example of Assembly Loss at 10 F.P.S.	
	125# Flg's.	Bell Ends	250# Flg's.	4	5	6	7	8	9	10	11	12	13	14	Roto.	Gate
8x 6x 8	4'- 7⅛"	6'-11⅛"	4'- 8"	.020	.031	.045	.061	.080	.101	.124	.150	.179	.210	.243	.657	.781
10x 8x10	4'- 7½"	6'-11½"	4'- 8½"	.055	.085	.123	.167	.218	.275	.340	.411	.490	.574	.666	.383	.723
10x 6x10	4'- 7⅛"	6'-11⅛"	4'- 8"	.353	.552	.795	1.08	1.41	1.79	2.21	2.67	3.18	3.73	4.33	2.93	.722
12x10x12	5'- 0⅛"	7'- 4⅛"	5'- 1½"	.064	.100	.145	.196	.257	.325	.401	.485	.577	.678	.786	.286	.687
12x 8x12	4'- 7½"	6'-11½"	4'- 8½"	.124	.193	.278	.379	.495	.627	.774	.936	1.11	1.30	1.51	1.45	.676
12x 6x12	4'- 7⅛"	6'-11⅛"	4'- 8"	1.61	2.52	3.64	4.95	6.46	8.18	10.1	12.2	14.5	17.1	19.8	10.8	.670
14x12x14	6'- 7"	7'-11"	6'- 8½"	.071	.111	.160	.218	.285	.360	.445	.538	.640	.752	.872	.240	.685
14x10x14	6'- 4⅛"	7'- 8⅛"	6'- 5½"	.001	.001	.001	.002	.003	.003	.004	.005	.006	.007	.008	.683	.679
14x 8x14	5'-11½"	7'- 3½"	6'- 0½"	.390	.610	.878	1.19	1.56	1.97	2.44	2.95	3.51	4.17	4.78	3.11	.670
16x14x16	6'-11½"	8'- 3½"	7'- 1"	.072	.113	.162	.221	.289	.365	.451	.546	.649	.762	.884	.200	.651
16x12x16	6'- 7"	7'-11"	6'- 8½"	.026	.040	.058	.079	.103	.131	.161	.195	.232	.272	.316	.482	.643
16x10x16	6'- 4⅛"	7'- 8⅛"	6'- 5½"	.195	.305	.439	.598	.780	.988	1.22	1.47	1.75	2.06	2.39	1.86	.641
16x 8x16	5'-11½"	7'- 3½"	6'- 0½"	1.22	1.91	2.75	3.74	4.89	6.19	7.64	9.24	11.0	12.9	15.0	8.27	.630
18x16x18	7'- 3"	8'- 7"	7'- 5"	.071	.111	.160	.218	.284	.359	.444	.537	.639	.750	.870	.173	.617
18x14x18	6'-11½"	8'- 3½"	7'- 1"	.036	.057	.082	.111	.145	.184	.227	.275	.327	.384	.445	.384	.611
18x12x18	6'- 7"	7'-11"	6'- 8½"	.098	.154	.221	.301	.393	.498	.615	.743	.884	1.04	1.20	1.22	.605
18x10x18	6'- 4⅛"	7'- 8⅛"	6'- 5½"	.676	1.06	1.52	2.07	2.71	3.43	4.23	5.12	6.08	7.14	8.28	4.83	.600
20x18x20	8'- 5¾"	9'- 9¾"	8'- 7⅜"	.070	.109	.157	.215	.280	.355	.438	.530	.630	.740	.858	.163	.601
20x16x20	8'- 3"	9'- 7"	8'- 5"	.046	.072	.104	.142	.185	.235	.290	.351	.417	.490	.568	.307	.597
20x14x20	7'-11½"	9'- 3½"	8'- 1"	.024	.037	.054	.074	.096	.121	.150	.181	.216	.253	2.94	.742	.592
20x12x20	7'- 7"	8'-11"	7'- 8½"	.277	.432	.622	.847	1.11	1.40	1.73	2.09	2.49	2.92	3.39	2.32	.590
20x10x20	7'- 4⅛"	8'- 8⅛"	7'- 5½"	1.17	1.83	2.64	3.59	4.69	5.94	7.33	8.86	10.5	12.4	14.4	7.91	.580
24x20x24	8'-11"	10'- 3"	9'- 0⅝"	.053	.083	.120	.163	.214	.271	.334	.404	.481	.564	.654	.228	.562
24x18x24	8'- 5¾"	9'- 9¾"	8'- 7⅜"	.015	.024	.035	.047	.061	.078	.096	.116	.138	.163	.188	.460	.556
24x16x24	8'- 3"	9'- 7"	8'- 5"	.103	.162	.233	.317	.414	.524	.647	.782	.930	1.09	1.27	1.20	.553
24x14x24	7'-11½"	9'- 3½"	8'- 1"	.460	.720	1.04	1.41	1.84	2.33	2.88	3.48	4.14	4.86	5.64	3.43	.550
24x12x24	7'- 7"	8'-11"	7'- 8½"	1.42	2.22	3.19	4.34	5.67	7.18	8.87	10.7	12.8	15.0	17.4	9.41	.540
30x24x30	10'- 4"	10'-11"	10'- 5¾"	.035	.054	.078	.106	.138	.175	.216	.261	.311	.365	.423	.303	.519
30x20x30	9'- 7"	10'- 2"	9'- 8⅝"	.155	.242	.349	.475	.620	.786	.970	1.17	1.40	1.64	1.90	1.48	.510
30x18x30	9'- 1¾"	9'- 8¾"	9'- 3⅜"	.465	.727	1.05	1.42	1.86	2.35	2.91	3.51	4.18	4.91	5.70	3.42	.510
30x16x30	8'-11"	9'- 6"	9'- 1"	1.17	1.83	2.64	3.58	4.68	5.93	7.32	8.85	10.5	12.4	14.4	7.82	.500
36x30x36	12'- 0"	12'- 7"	12'- 1¾"	.044	.069	.099	.135	.177	.224	.276	.334	.397	.467	.541	.207	.483
36x24x36	11'- 4"	11'-11"	11'- 5¾"	.150	.235	.339	.461	.602	.762	.942	1.14	1.35	1.59	1.84	1.42	.478
36x20x36	10'- 7"	11'- 2"	10'- 8⅝"	.848	1.33	1.91	2.60	3.40	4.30	5.31	6.42	7.64	8.96	10.4	5.78	.470
36x18x36	10'- 1¾"	10'- 8¾"	10'- 3⅜"	1.68	2.62	3.78	5.14	6.72	8.50	10.5	12.7	15.1	17.7	20.6	11.0	.470
42x36x42	12'- 6½"	13'- 0½"	12'-10"	.044	.069	.099	.134	.175	.222	.274	.332	.395	.463	.537	.159	.433
42x30x42	12'- 0"	12'- 6"	12'- 1¾"	.074	.115	.166	.226	.295	.374	.462	.558	.664	.780	.904	.892	.430
42x24x42	11'- 4"	11'-10"	11'- 5¾"	.079	1.24	1.79	2.43	3.18	4.02	4.97	6.01	7.15	8.40	9.74	5.39	.420
48x42x48	13'- 7¼"	19'- 9¼"	13'- 9⅜"	.038	.060	.086	.118	.154	.195	.240	.290	.346	.405	.470	.141	.381
48x36x48	12'- 6½"	18'- 8½"	12'-10"	.038	.060	.086	.118	.154	.195	.240	.290	.346	.405	.470	.614	.374
48x30x48	12'- 0"	18'- 2"	12'- 1¾"	.435	.680	.979	1.33	1.74	2.20	2.72	3.29	3.91	4.59	5.32	3.09	.370
48x24x48	11'- 4"	17'- 6"	11'- 5¾"	2.09	3.27	4.71	6.42	8.38	10.6	13.1	15.8	18.8	22.1	25.6	13.5	.370

The small diameter in each assembly indicates Rotovalve size. Loss or Saving Tables shown apply only to the 125# Flange Assemblies.

LOSSES BASED ON A.W.W.A. SHORT PATTERN REDUCER AND INCREASER SECTIONS.

Size of Roto-Valve Assembly	Laying Length			Net **SAVING** or **LOSS** for Rotovalve Assembly over Full Size Gate Valve Assembly Based on Pipe Line Velocities in F.P.S.											Comparative Example of Assembly Loss at 10 F.P.S.	
	125# Flg's.	Bell Ends	250# Flg's.	4	5	6	7	8	9	10	11	12	13	14	Roto.	Gate
8x 6x 8	5'- 5⅛"	6'-11⅛"	5'- 6"	.028	.044	.063	.085	.111	.140	.173	.210	.250	.292	.339	.649	.822
10x 8x10	5'- 5½"	6'-11½"	5'- 6½"	.060	.094	.136	.184	.241	.305	.376	.455	.542	.636	.737	.378	.754
10x 6x10	5'- 5⅛"	6'-11⅛"	5'- 6"	.206	.322	.464	.632	.826	1.04	1.29	1.56	1.86	2.18	2.53	2.04	.750
12x10x12	5'-10⅛"	7'- 4⅛"	5'-11½"	.069	.108	.155	.211	.275	.348	.430	.520	.619	.726	.842	.283	.713
12x 8x12	5'- 5½"	6'-11½"	5'- 6½"	.051	.080	.115	.157	.205	.259	.320	.387	.461	.540	.627	1.02	.700
12x 6x12	5'- 5⅛"	6'-11⅛"	5'- 6"	1.05	1.65	2.37	3.23	4.22	5.34	6.60	7.98	9.50	11.1	12.9	7.33	.700
14x12x14	7'- 5"	7'-11"	7'- 6½"	.075	.117	.168	.229	.299	.378	.467	.565	.672	.789	.915	.240	.707
14x10x14	7'- 2⅛"	7'- 8⅛"	7'- 3½"	.012	.019	.027	.036	.047	.060	.074	.090	.107	.125	.145	.626	.700
14x 8x14	6'- 9½"	7'- 3½"	6'-10½"	.270	.422	.608	.828	1.08	1.37	1.69	2.04	2.43	2.85	3.31	2.38	.690
16x14x16	7'- 9½"	8'- 3½"	7'-11"	.075	.118	.169	.230	.301	.381	.470	.569	.677	.794	.922	.200	.670
16x12x16	7'- 5"	7'-11"	7'- 6½"	.035	.054	.078	.106	.138	.175	.216	.261	.311	.365	.423	.445	.661
16x10x16	7'-2⅛"	7'- 8⅛"	7'- 3½"	.125	.195	.281	.382	.499	.632	.780	.944	1.12	1.32	1.53	1.44	.660
16x 8x16	6'- 9½"	7'- 3½"	6'-10½"	.882	1.38	1.98	2.70	3.53	4.47	5.52	6.67	7.94	9.32	10.8	6.17	.650
18x16x18	8'- 1"	8'- 7"	8'- 3"	.074	.115	.165	.225	.294	.372	.459	.556	.661	.776	.900	.173	.632
18x14x18	7'- 9½"	8'- 3½"	7'-11"	.043	.067	.097	.132	.172	.218	.269	.326	.387	.455	.528	.358	.627
18x12x18	7'- 5"	7'-11"	7'- 6½"	.055	.086	.123	.168	.219	.278	.343	.415	.494	.579	.672	.963	.620
18x10x18	7'- 2⅛"	7'- 8⅛"	7'- 3½"	.481	.752	1.08	1.47	1.92	2.44	3.01	3.64	4.33	5.08	5.90	3.63	.620
20x18x20	9'- 3¾"	9'- 9¾"	9'- 5⅜"	.072	.113	.163	.221	.290	.366	.452	.547	.651	.764	.886	.163	.615
20x16x20	9'- 1"	9'- 7"	9'- 3"	.049	.076	.110	.149	.195	.246	.304	.368	.438	.514	.596	.307	.611
20x14x20	8'- 9½"	9'- 3½"	8'-11"	.011	.017	.025	.034	.044	.056	.069	.083	.099	.116	.135	.675	.606
20x12x20	8'- 5"	8'-11"	8'- 6½"	.203	.317	.457	.622	.812	1.03	1.27	1.53	1.83	2.14	2.49	1.87	.600
20x10x20	8'- 2⅛"	8'- 8⅛"	8'- 3½"	.901	1.41	2.02	2.76	3.60	4.56	5.63	6.81	8.10	9.52	11.0	6.23	.600
24x20x24	9'- 9"	10'- 3"	9'-10⅝"	.055	.086	.124	.169	.221	.280	.345	.417	.497	.583	.676	.228	.573
24x18x24	9'- 3¾"	9'- 9¾"	9'- 5⅜"	.023	.037	.053	.072	.094	.118	.146	.177	.210	.247	.286	.422	.568
24x16x24	9'- 1"	9'- 7"	9'- 3"	.067	.106	.152	.207	.271	.343	.423	.511	.609	.714	.828	.988	.565
24x14x24	8'- 9½"	9'- 3½"	8'-11"	.345	.540	.777	1.06	1.38	1.75	2.16	2.61	3.11	3.65	4.23	2.72	.560
24x12x24	8'- 5"	8'-11"	8'- 6½"	1.10	1.72	2.48	3.37	4.41	5.58	6.89	8.33	9.92	11.6	13.5	7.45	.560
30x24x30	13'- 8"	14'- 3"	13'- 9¾"	.046	.071	.103	.140	.183	.231	.285	.345	.410	.482	.559	.268	.553
30x20x30	12'-11"	13'- 6"	13'- 0⅝"	.027	.043	.062	.084	.110	.139	.172	.208	.247	.290	.337	.717	.545
30x18x30	12'- 5¾"	13'- 0¾"	12'- 7⅜"	.137	.215	.309	.421	.550	.696	.860	1.04	1.24	1.45	1.68	1.40	.540
30x16x30	12'- 3"	12'-10"	12'- 5"	.369	.577	.831	1.13	1.48	1.87	2.31	2.79	3.32	3.90	4.52	2.85	.540
36x30x36	14'-10"	15'- 5"	14'-11¾"	.050	.078	.112	.152	.199	.251	.310	.375	.446	.524	.608	.197	.507
36x24x36	14'- 2"	14'- 9"	14'- 3¾"	.044	.068	.098	.134	.175	.222	.274	.331	.394	.463	.537	.778	.504
36x20x36	13'- 5"	14'- 0"	13'- 6⅝"	.333	.520	.748	1.02	1.33	1.68	2.08	2.51	2.99	3.51	4.07	2.58	.500
36x18x36	12'-11¾"	13'- 6¾"	13'- 1⅜"	.702	1.10	1.58	2.15	2.81	3.55	4.39	5.31	6.32	7.42	8.60	4.87	.480
42x36x42	15'- 4½"	15'-10½"	15'- 8"	.048	.075	.108	.147	.191	.242	.299	.362	.430	.505	.586	.153	.452
42x30x42	14'-10"	15'- 4"	14'-11¾"	.009	.013	.019	.026	.034	.044	.054	.065	.078	.091	.106	.503	.449
42x24x42	14'- 2"	14'- 8"	14'- 3¾"	.321	.502	.722	.985	1.29	1.63	2.01	2.43	2.89	3.39	3.94	2.45	.440
48x42x48	16'- 5¼"	25'- 3¼"	16'- 7⅜"	.042	.065	.094	.128	.167	.211	.260	.315	.375	.440	.510	.137	.397
48x36x48	15'- 4½"	24'- 2½"	15'- 8"	.005	.008	.011	.015	.020	.025	.031	.038	.045	.052	.061	.360	.391
48x30x48	14'-10"	23'- 8"	14'-11¾"	.166	.260	.374	.510	.666	.842	1.04	1.26	1.50	1.76	2.04	1.43	.390
48x24x48	14'- 2"	23'- 0"	14'- 3¾"	1.05	1.64	2.36	3.21	4.20	5.31	6.56	7.93	9.44	11.1	12.8	6.94	.380

The small diameter in each assembly indicates Rotovalve size. Loss or Saving Tables shown apply only to the 125# Flange Assemblies.

LOSSES BASED ON A.W.W.A. SHORT PATTERN REDUCER AND LONG PATTERN INCREASER SECTIONS.

Size of Roto-Valve Assembly	Laying Length			Net **SAVING** or **LOSS** for Rotovalve Assembly over Full Size Gate Valve Assembly Based on Pipe Line Velocities in F.P.S.											Comparative Example of Assembly Loss at 10 F.P.S.	
	125# Flg's.	Bell Ends	250# Flg's.	4	5	6	7	8	9	10	11	12	13	14	Roto.	Gate
8x 6x 8	6'- 3⅛"	6'-11⅛"	6'- 4"	.022	.034	.049	.067	.085	.109	.135	.163	.195	.228	.264	.727	.862
10x 8x10	6'- 3½"	6'-11½"	6'- 4½"	.056	.088	.127	.169	.226	.286	.353	.427	.508	.596	.692	.432	.785
10x 6x10	6'- 3⅛"	6'-11⅛"	6'- 4"	.214	.335	.482	.656	.857	1.08	1.34	1.62	1.93	2.26	2.62	2.13	.790
12x10x12	6'- 8⅛"	7'- 4⅛"	6'- 9½"	.067	.104	.150	.204	.266	.338	.416	.503	.599	.702	.815	.322	.738
12x 8x12	6'- 3½"	6'-11½"	6'- 4½"	.057	.088	.127	.173	.226	.287	.354	.428	.510	.598	.694	1.08	.726
12x 6x12	6'- 3⅛"	6'-11⅛"	6'- 4"	1.07	1.68	2.41	3.29	4.29	5.43	6.71	8.12	9.66	11.3	13.1	7.43	.720
14x12x14	8'- 3"	7'-11"	8'- 4½"	.073	.114	.165	.224	.294	.372	.459	.555	.660	.776	.899	.269	.728
14x10x14	8'- 0⅛"	7'- 8⅛"	8'- 1½"	.008	.013	.018	.025	.033	.041	.051	.062	.074	.086	.100	.671	.722
14x 8x14	7'- 7½"	7'- 3½"	7'- 8½"	.278	.435	.626	.852	1.11	1.41	1.74	2.10	2.50	2.94	3.41	2.45	.710
16x14x16	8'- 7½"	8'- 3½"	8'- 9"	.074	.116	.167	.227	.297	.376	.464	.561	.668	.784	.909	.224	.688
16x12x16	8'- 3"	7'-11"	8'- 4½"	.032	.050	.072	.098	.130	.164	.202	.244	.290	.342	.396	.478	.680
16x10x16	8'- 0⅛"	7'- 8⅛"	8'- 1½"	.131	.205	.295	.402	.524	.664	.820	.992	1.18	1.38	1.61	1.49	.670
16x 8x16	7'- 7½"	7'- 3½"	7'- 8½"	.892	1.39	2.01	2.73	3.57	4.52	5.58	6.74	8.03	9.42	10.9	6.24	.660
18x16x18	8'-11"	8'- 7"	9'- 1"	.072	.113	.163	.221	.290	.408	.453	.547	.651	.766	.888	.194	.647
18x14x18	8'- 7½"	8'- 3½"	8'- 9"	.041	.064	.092	.125	.164	.207	.256	.309	.367	.433	.502	.386	.642
18x12x18	8'- 3"	7'-11"	8'- 4½"	.058	.091	.131	.179	.233	.295	.365	.441	.525	.616	.714	1.00	.635
18x10x18	8'- 0⅛"	7'- 8⅛"	8'- 1½"	.488	.762	1.10	1.49	1.95	2.47	3.05	3.69	4.39	5.15	5.97	3.68	.630
20x18x20	10'- 1¾"	9'- 9¾"	10'- 3⅜"	.071	.112	.161	.219	.286	.362	.447	.541	.643	.755	.876	.181	.628
20x16x20	9'-11"	9'- 7"	10'- 1"	.047	.073	.105	.143	.188	.238	.294	.355	.423	.497	.576	.330	.624
20x14x20	9'- 7½"	9'- 3½"	9'- 9"	.014	.021	.031	.042	.054	.069	.085	.103	.122	.143	.166	.705	.620
20x12x20	9'- 3"	8'-11"	9'- 4½"	.219	.327	.471	.641	.838	1.06	1.31	1.58	1.88	2.21	2.56	1.92	.610
20x10x20	9'- 0⅛"	8'- 8⅛"	9'- 1½"	.908	1.42	2.04	2.78	3.63	4.60	5.68	6.86	8.16	9.58	11.1	6.29	.610
24x20x24	10'- 7"	10'- 3"	10'- 8⅝"	.054	.085	.122	.166	.218	.275	.340	.411	.490	.575	.666	.245	.585
24x18x24	10'- 1¾"	9'- 9¾"	10'- 3⅜"	.022	.034	.049	.067	.087	.110	.136	.165	.196	.230	.266	.443	.579
24x16x24	9'-11"	9'- 7"	10'- 1"	.069	.108	.156	.212	.277	.351	.434	.524	.624	.734	.850	1.01	.576
24x14x24	9'- 7½"	9'- 3½"	9'- 9"	.349	.544	.784	1.07	1.39	1.76	2.18	2.64	3.14	3.68	4.27	2.75	.570
24x12x24	9'- 3"	8'-11"	9'- 4½"	1.11	1.73	2.49	3.39	4.43	5.60	6.92	8.36	9.96	1.17	1.35	7.49	.570
30x24x30	17'- 0"	17'- 7"	17'- 1¾"	.042	.066	.094	.128	.168	.212	.262	.317	.377	.443	.514	.326	.588
30x20x30	16'- 3"	16'-10"	16'- 4⅝"	.035	.054	.078	.107	.139	.176	.218	.264	.314	.368	.427	.798	.580
30x18x30	15'- 9¾"	16'- 4¾"	15'-11⅜"	.147	.230	.331	.451	.589	.746	.921	1.11	1.32	1.55	1.80	1.50	.579
30x16x30	15'- 7"	16'- 2"	15'- 9"	.400	.624	.900	1.22	1.60	2.02	2.50	3.02	3.60	4.22	4.90	3.07	.570
36x30x36	17'- 8"	18'- 3"	17'- 9¾"	.048	.075	.108	.147	.192	.243	.300	.363	.432	.507	.588	.231	.531
36x24x36	17'- 0"	17'- 7"	17'- 1¾"	.050	.078	.112	.152	.199	.252	.311	.376	.447	.525	.609	.836	.525
36x20x36	16'- 3"	16'-10"	16'- 4⅝"	.342	.534	.770	1.05	1.37	1.73	2.14	2.59	3.08	3.61	4.19	2.66	.520
36x18x36	15'- 9¾"	16'- 4¾"	15'-11⅜"	.710	1.11	1.60	2.17	2.84	3.59	4.44	5.36	6.38	7.50	8.70	4.96	.520
42x36x42	18'- 2½"	18'- 8½"	18'- 6"	.046	.072	.104	.142	.185	.234	.289	.350	.416	.488	.566	.184	.473
42x30x42	17'- 8"	18'- 2"	17'- 9¾"	.012	.019	.027	.037	.049	.062	.076	.092	.109	.128	1.49	.545	.469
42x24x42	17'- 0"	17'- 6"	17'- 1¾"	.329	.514	.741	1.01	1.32	1.67	2.06	2.49	2.96	3.48	4.03	2.52	.460
48x42x48	19'- 3¼"	30'- 9¼"	19'- 5⅜"	.040	.062	.089	.121	.158	.200	.247	.299	.356	.417	.484	.168	.415
48x36x48	18'- 2½"	29'- 8½"	18'- 6"	.001	.002	.003	.004	.005	.006	.008	.010	.012	.014	.016	.400	.408
48x30x48	17'- 8"	29'- 2"	17'- 9¾"	.173	.270	.389	.529	.690	.874	1.08	1.31	1.55	1.82	2.16	1.48	.400
48x24x48	17'- 0"	28'- 6"	17'- 1¾"	1.06	1.65	2.38	3.24	4.23	5.36	6.62	8.00	9.52	11.2	13.0	7.02	.400

The small diameter in each assembly indicates Rotovalve size. Loss or Saving Tables shown apply only to the 125# Flange Assemblies.

LOSSES BASED ON A.W.W.A. LONG PATTERN REDUCER AND INCREASER SECTIONS.

Size of Rotovalve Assembly	Laying Length		Net **SAVING** or **LOSS** for Rotovalve Assembly over Full Size Gate Valve Assembly Based on Pipe Line Velocities in F.P.S.										Comparative Example of Assembly Loss at 10 F.P.S.	
	125# Flg's.	250# Flg's.	4	5	6	7	8	9	10	11	12	13	14	Roto.	Gate
8x 6x 8	4'- 7⅛"	4'- 8"	.021	.033	.048	.065	.085	.108	.133	.161	.191	.225	.260	.648	.781
10x 8x10	4'- 7½"	4'- 8½"	.055	.086	.124	.169	.221	.279	.345	.417	.496	.583	.676	.378	.723
10x 6x10	4'- 7⅛"	4'- 8"	.243	.380	.546	.744	.972	1.23	1.52	1.84	2.19	2.56	2.97	2.24	.722
12x10x12	5'- 0⅛"	5'- 1½"	.065	.101	.145	.198	.258	.327	.404	.489	.581	.682	.791	.283	.687
12x 8x12	4'- 7½"	4'- 8½"	.071	.111	.160	.218	.285	.360	.445	.538	.640	.752	.872	1.12	.675
12x 6x12	4'- 7⅛"	4'- 8"	1.20	1.87	2.70	3.67	4.80	6.07	7.50	9.07	10.8	12.7	14.7	8.17	.670
14x12x14	6'- 7"	6'- 8½"	.071	.111	.160	.218	.285	.360	.445	.538	.640	.752	.872	.240	.685
14x10x14	6'- 4⅛"	6'- 5½"	.006	.010	.014	.019	.025	.032	.039	.047	.056	.066	.076	.640	.679
14x 8x14	5'-11½"	6'- 0½"	.306	.477	.687	.936	1.22	1.55	1.91	2.31	2.75	3.22	3.74	2.58	.670
16x14x16	6'-11½"	7'- 1"	.072	.113	.162	.221	.289	.365	.451	.546	.649	.762	.884	.200	.651
16x12x16	6'- 7"	6'- 8½"	.030	.047	.068	.093	.121	.154	.190	.230	.273	.321	.372	.453	.643
16x10x16	6'- 4⅛"	6'- 5½"	.147	.227	.327	.445	.582	.736	.919	1.10	1.31	1.54	1.78	1.56	.641
16x 8x16	5'-11½"	6'- 0½"	.999	1.56	2.24	3.06	3.99	5.05	6.24	7.54	8.98	10.5	12.2	6.87	.630
18x16x18	7'- 3"	7'- 5"	.071	.111	.160	.218	.284	.360	.444	.537	.639	.750	.870	.173	.617
18x14x18	6'-11½"	7'- 1"	.039	.062	.089	.121	.158	.200	.247	.299	.355	.417	.484	.364	.611
18x12x18	6'- 7"	6'- 8½"	.069	.107	.155	.211	.275	.348	.430	.520	.619	.726	.842	1.03	.600
18x10x18	6'- 4⅛"	6'- 5½"	.549	.857	1.23	1.68	2.19	2.78	3.43	4.15	4.94	5.80	6.72	4.03	.600
20x18x20	8'- 5¾"	8'- 7⅜"	.070	.109	.157	.215	.280	.355	.438	.530	.630	.740	.858	.163	.601
20x16x20	8'- 3"	8'- 5"	.046	.072	.104	.142	.185	.235	.290	.351	.417	.490	.568	.307	.597
20x14x20	7'-11½"	8'- 1"	.016	.025	.036	.049	.064	.081	.100	.121	.144	.169	.196	.692	.592
20x12x20	7'- 7"	7'- 8½"	.222	.347	.500	.680	.888	1.12	1.39	1.68	2.00	2.35	2.72	1.98	.590
20x10x20	7'- 4⅛"	7'- 5½"	.993	1.55	2.23	3.04	3.97	5.02	6.20	7.50	8.92	10.5	12.1	6.79	.590
24x20x24	8'-11"	9'- 0⅝"	.053	.083	.120	.163	.214	.271	.334	.404	.481	.564	.654	.228	.562
24x18x24	8'- 5¾"	8'- 7⅜"	.020	.031	.045	.061	.079	.101	.125	.151	.180	.211	.245	.431	.556
24x16x24	8'- 3"	8'- 5"	.077	.121	.174	.236	.309	.391	.483	.584	.695	.816	.946	1.04	.557
24x14x24	7'-11½"	8'- 1"	.385	.602	.867	1.18	1.54	1.95	2.41	2.91	3.47	4.07	4.72	2.96	.550
24x12x24	7'- 7"	7'- 8½"	1.19	1.87	2.69	3.66	4.78	6.04	7.47	9.04	10.7	12.6	14.6	8.02	.550
30x24x30	10'- 4"	10'- 5¾"	.088	.060	.087	.118	.154	.195	.241	.291	.347	.407	.472	.278	.519
30x20x30	9'- 7"	9'- 8⅝"	.098	.152	.219	.299	.390	.494	.610	.738	.878	1.03	1.19	1.12	.510
30x18x30	9'- 1¾"	9'- 3⅜"	.332	.520	.748	1.02	1.33	1.68	2.08	2.51	2.99	3.51	4.07	2.58	.500
30x16x30	8'-11"	9'- 1"	.880	1.37	1.97	2.69	3.51	4.44	5.49	6.64	7.90	9.28	10.7	5.99	.500
36x30x36	12'- 0"	12'- 1¾"	.046	.072	.103	.140	.183	.232	.286	.346	.412	.483	.560	.197	.483
36x24x36	11'- 4"	11'- 5¾"	.105	.164	.236	.322	.420	.532	.657	.795	.946	1.11	1.29	1.13	.473
36x20x36	10'- 7"	10'- 8⅝"	.658	1.03	1.48	2.01	2.63	3.33	4.11	4.97	5.92	6.94	8.05	4.58	.470
36x18x36	10'- 1¾"	10'- 3⅜"	1.37	2.15	3.10	4.21	5.50	6.96	8.60	10.4	12.4	14.5	16.8	9.07	.470
42x36x42	12'- 6½"	12'-10"	.045	.070	.101	.137	.179	.226	.279	.338	.402	.472	.547	.153	.432
42x30x42	12'- 0"	12'- 1¾"	.046	.072	.104	.142	.185	.235	.290	.351	.417	.490	.568	.719	.429
42x24x42	11'- 4"	11'- 5¾"	.644	1.01	1.45	1.97	2.58	3.26	4.03	4.87	5.80	6.81	7.90	4.45	.420
48x42x48	13'- 7¼"	13'- 9⅜"	.039	.061	.088	.120	.156	.198	.244	.295	.351	.413	.478	.137	.381
48x36x48	12'- 6½"	12'-10"	.020	.032	.046	.062	.081	.103	.127	.154	.183	.215	.249	.501	.374
48x30x48	12'- 0"	12'- 1¾"	.350	.547	.788	1.07	1.40	1.77	2.19	2.65	3.15	3.70	4.29	2.56	.370
48x24x48	11'- 4"	11'- 5¾"	1.79	2.80	4.03	5.49	7.17	9.07	11.2	13.5	16.1	18.9	21.9	11.6	.370

The small diameter in each assembly indicates Rotovalve size. Loss or Saving Tables shown apply only to the 125# Flange Assemblies.

LOSSES BASED ON STEEL TAPERED SECTIONS HAVING THE SAME LAYING LENGTHS AS A.W.W.A. SHORT PATTERN REDUCERS AND INCREASERS.

Size of Rotovalve Assembly	Laying Length 125# Flg's.	Laying Length 250# Flg's.	Net **SAVING** or **LOSS** for Rotovalve Assembly over Full Size Gate Valve Assembly Based on Pipe Line Velocities in F.P.S. 4	5	6	7	8	9	10	11	12	13	14	Comparative Example of Assembly Loss at 10 F.P.S. Roto.	Gate
8x 6x 8	5'- 5⅛"	5'- 6"	.028	.044	.063	.085	.112	.141	.174	.211	.251	.294	.341	.648	.822
10x 8x10	5'- 5½"	5'- 6½"	.060	.094	.136	.184	.241	.305	.376	.455	.542	.636	.737	.378	.754
10x 6x10	5'- 5⅛"	5'- 6"	.160	.250	.360	.490	.640	.810	1.00	1.21	1.44	1.69	1.96	1.75	.750
12x10x12	5'-10⅛"	5'-11½"	.069	.108	.155	.211	.275	.348	.430	.520	.619	.726	.842	.283	.713
12x 8x12	5'- 5½"	5'- 6½"	.029	.045	.065	.089	.116	.147	.182	.220	.262	.307	.356	.883	.701
12x 6x12	5'- 5⅛"	5'- 6"	.702	1.10	1.58	2.15	2.81	3.55	4.39	5.31	6.32	7.42	8.60	5.09	.700
14x12x14	7'- 5"	7'- 6½"	.075	.117	.168	.229	.299	.378	.467	.565	.672	.789	.915	.240	.707
14x10x14	7'- 2⅛"	7'- 3½"	.012	.019	.027	.036	.047	.060	.074	.090	.107	.125	.145	.626	.700
14x 8x14	6'- 9½"	6'-10½"	.218	.340	.489	.666	.870	1.10	1.36	1.64	1.96	2.30	2.66	2.05	.690
16x14x16	7'- 9½"	7'-11"	.075	.118	.169	.230	.301	.381	.470	.569	.677	.794	.922	.200	.670
16x12x16	7'- 5"	7'- 6½"	.035	.054	.078	.106	.138	.175	.216	.261	.311	.365	.423	.445	.661
16x10x16	7'- 2⅛"	7'- 3½"	.096	.150	.216	.294	.384	.486	.600	.726	.864	1.01	1.17	1.26	.660
16x 8x16	6'- 9½"	6'-10½"	.637	.995	1.43	1.95	2.55	3.22	3.98	4.81	5.73	6.72	7.80	4.63	.650
18x16x18	8'- 1"	8'- 3"	.074	.115	.165	.225	.294	.372	.459	.556	.661	.776	.900	.173	.632
18x14x18	7'- 9½"	7'-11"	.043	.067	.097	.132	.172	.218	.269	.326	.387	.455	.528	.358	.627
18x12x18	7'- 5"	7'- 6½"	.036	.056	.081	.110	.143	.181	.224	.271	.322	.378	.439	.844	.620
18x10x18	7'- 2⅛"	7'- 3½"	.342	.535	.770	1.05	1.37	1.73	2.14	2.59	3.08	3.61	4.19	2.76	.620
20x18x20	9'- 3¾"	9'- 5⅜"	.072	.113	.163	.221	.289	.365	.451	.546	.650	.762	.884	.164	.615
20x16x20	9'- 1"	9'- 3"	.049	.076	.110	.149	.195	.246	.304	.368	.438	.514	.596	.307	.611
20x14x20	8'- 9½"	8'-11"	.003	.005	.007	.009	.012	.015	.019	.023	.027	.032	.037	.625	.606
20x12x20	8'- 5"	8'- 6½"	.157	.245	.353	.480	.627	.794	.980	1.18	1.41	1.65	1.92	1.58	.600
20x10x20	8'- 2⅛"	8'- 3½"	.676	1.06	1.52	2.07	2.71	3.42	4.23	5.11	6.09	7.14	8.28	4.83	.600
24x20x24	9'- 9"	9'-10⅝"	.055	.086	.124	.169	.221	.280	.345	.417	.497	.583	.676	.228	.573
24x18x24	9'- 3¾"	9'- 5⅜"	.028	.044	.063	.085	.112	.141	.174	.211	.251	.294	.341	.394	.568
24x16x24	9'- 1"	9'- 3"	.045	.070	.101	.138	.180	.227	.281	.340	.404	.475	.550	.846	.565
24x14x24	8'- 9½"	8'-11"	.251	.392	.565	.768	1.00	1.27	1.57	1.90	2.26	2.65	3.07	2.13	.560
24x12x24	8'- 5"	8'- 6½"	.835	1.30	1.88	2.56	3.34	4.23	5.22	6.32	7.51	8.82	10.2	5.78	.560
30x24x30	13'- 8"	13'- 9¾"	.046	.071	.103	.140	.183	.231	.285	.345	.410	.482	.559	.268	.553
30x20x30	12'-11"	13'- 0⅝"	.027	.043	.062	.084	.110	.139	.172	.208	.247	.290	.307	.717	.545
30x18x30	12'- 5¾"	12'- 7⅜"	.137	.215	.310	.421	.550	.696	.860	1.04	1.24	1.45	1.68	1.40	.540
30x16x30	12'- 3"	12'- 5"	.355	.555	.799	1.09	1.42	1.80	2.22	2.68	3.20	3.75	4.35	2.76	.540
36x30x36	14'-10"	14'-11¾"	.050	.078	.112	.152	.199	.251	.310	.375	.446	.524	.608	.197	.507
36x24x36	14'- 2"	14'- 3¾"	.036	.056	.081	.111	.145	.183	.226	.273	.325	.382	.443	.730	.504
36x20x36	13'- 5"	13'- 6⅝"	.294	.460	.662	.902	1.18	1.49	1.84	2.22	2.65	3.11	3.60	2.34	.500
36x18x36	12'-11¾"	13'- 1⅜"	.612	.957	1.38	1.87	2.45	3.10	3.83	4.63	5.51	6.47	7.50	4.31	.480
42x36x42	15' -4½"	15'- 8"	.048	.075	.108	.147	.191	.242	.299	.362	.430	.505	.586	.153	.452
42x30x42	14'-10"	14'-11¾"	.004	.006	.009	.012	.016	.020	.025	.030	.036	.042	.049	.474	.449
42x24x42	14'- 2"	14'- 3¾"	.278	.435	.626	.852	1.11	1.41	1.74	2.10	2.50	2.94	3.41	2.18	.440
48x42x48	16'- 5¼"	16'- 7⅜"	.042	.065	.094	.128	.167	.211	.260	.315	.375	.440	.510	.137	.397
48x36x48	15'- 4½"	15'- 8"	.008	.013	.018	.025	.032	.041	.050	.061	.072	.085	.098	.341	.391
48x30x48	14'-10"	14'-11¾"	.142	.222	.320	.436	.570	.721	.890	1.08	1.28	1.50	1.74	1.28	.390
48x24x48	14'- 2"	14'- 3¾"	.914	1.43	2.06	2.80	3.66	4.63	5.72	6.92	8.23	9.66	11.2	6.10	.380

The small diameter in each assembly indicates Rotovalve size. Loss or Saving Tables shown apply only to the 125# Flange Assemblies.

LOSSES BASED ON STEEL TAPERED SECTIONS HAVING THE SAME LAYING LENGTHS AS A.W.W.A. SHORT PATTERN REDUCERS AND LONG PATTERN INCREASERS.

Size of Rotovalve Assembly	Laying Length		Net **SAVING** or **LOSS** for Rotovalve Assembly over Full Size Gate Valve Assembly Based on Pipe Line Velocities in F.P.S.											Comparative Example of Assembly Loss at 10 F.P.S.	
	125# Flg's.	250# Flg's.	4	5	6	7	8	9	10	11	12	13	14	Roto.	Gate
8x 6x 8	6′- 3⅛″	6′- 4″	.022	.034	.049	.067	.086	.110	.136	.164	.196	.230	.266	.726	.862
10x 8x10	6′- 3½″	6′- 4½″	.056	.088	.127	.169	.226	.286	.353	.427	.508	.596	.692	.432	.785
10x 6x10	6′- 3⅛″	6′- 4″	.168	.262	.378	.514	.672	.850	1.05	1.27	1.51	1.77	2.06	1.84	.790
12x10x12	6′- 8⅛″	6′- 9½″	.067	.104	.150	.204	.267	.338	.417	.504	.600	.704	.817	.321	.738
12x 8x12	6′- 3½″	6′- 4½″	.035	.055	.079	.107	.140	.177	.219	.265	.315	.370	.429	.945	.726
12x 6x12	6′- 3⅛″	6′- 4″	.715	1.12	1.61	2.19	2.86	3.62	4.47	5.41	6.43	7.55	8.76	5.19	.720
14x12x14	8′- 3″	8′- 4½″	.073	.114	.165	.224	.293	.371	.458	.554	.659	.774	.897	.270	.728
14x10x14	8′- 0⅛″	8′- 1½″	.008	.013	.019	.026	.034	.043	.053	.064	.076	.090	.104	.669	.722
14x 8x14	7′- 7½″	7′- 8½″	.224	.350	.504	.686	.896	1.13	1.40	1.69	2.01	2.36	2.74	2.11	.710
16x14x16	8′- 7½″	8′- 9″	.074	.116	.167	.227	.297	.376	.464	.561	.668	.784	.909	.224	.688
16x12x16	8′- 3″	8′- 4½″	.032	.050	.072	.098	.129	.163	.201	.243	.289	.340	.394	.479	.680
16x10x16	8′- 0⅛″	8′- 1½″	.101	.158	.227	.309	.404	.511	.631	.763	.908	1.06	1.23	1.30	.670
16x 8x16	7′- 7½″	7′- 8½″	.646	1.01	1.45	1.98	2.58	3.27	4.04	4.89	5.82	6.82	7.92	4.70	.660
18x16x18	8′-11″	9′- 1″	.072	.113	.163	.221	.289	.407	.452	.546	.650	.764	.886	.195	.647
18x14x18	8′- 7½″	8′- 9″	.041	.064	.092	.125	.163	.206	.255	.308	.367	.431	.500	.387	.642
18x12x18	8′- 3″	8′- 4½″	.039	.062	.089	.121	.158	.200	.247	.299	.355	.417	.484	.882	.635
18x10x18	8′- 0⅛″	8′- 1½″	.347	.542	.780	1.06	1.39	1.76	2.17	2.62	3.12	3.66	4.25	2.80	.630
20x18x20	10′- 1¾″	10′- 3⅜″	.071	.112	.161	.219	.285	.361	.446	.540	.642	.753	.874	.182	.628
20x16x20	9′-11″	10′- 1″	.047	.073	.105	.143	.187	.237	.293	.354	.422	.495	.574	.331	.624
20x14x20	9′- 7½″	9′- 9″	.006	.009	.013	.018	.023	.029	.036	.044	.052	.061	.071	.656	.620
20x12x20	9′- 3″	9′- 4½″	.162	.252	.364	.495	.646	.818	1.01	1.21	1.45	1.71	1.98	1.62	.610
20x10x20	9′- 0⅛″	9′- 1½″	.683	1.07	1.54	2.09	2.73	3.46	4.27	5.17	6.14	7.22	8.36	4.88	.610
24x20x24	10′- 7″	10′- 8⅝″	.054	.085	.122	.166	.218	.275	.340	.411	.490	.575	.666	.245	.585
24x18x24	10′- 1¾″	10′- 3⅜″	.026	.041	.059	.080	.105	.133	.164	.198	.236	.277	.321	.415	.579
24x16x24	9′-11″	10′- 1″	.047	.074	.107	.145	.190	.240	.297	.359	.427	.502	.582	.873	.576
24x14x24	9′- 7½″	9′- 9″	.270	.422	.608	.828	1.08	1.37	1.59	2.04	2.43	2.85	3.31	2.16	.570
24x12x24	9′- 3″	9′- 4½″	.840	1.31	1.89	2.57	3.36	4.25	5.25	6.35	7.56	8.87	10.3	5.82	.570
30x24x30	17′- 0″	17′- 1¾″	.042	.066	.095	.130	.170	.215	.265	.321	.382	.448	.520	.323	.588
30x20x30	16′- 3″	16′- 4⅝″	.035	.055	.079	.107	.140	.177	.219	.265	.315	.370	.429	.799	.580
30x18x30	15′- 9¾″	15′-11⅜″	.133	.208	.299	.407	.532	.672	.831	1.00	1.20	1.41	1.63	1.41	.579
30x16x30	15′- 7″	15′- 9″	.352	.550	.792	1.08	1.41	1.78	2.20	2.65	3.17	3.72	4.31	2.77	.570
36x30x36	17′- 8″	17′- 9¾″	.048	.075	.108	.147	.192	.243	.300	.363	.432	.507	.588	.231	.531
36x24x36	17′- 0″	17′- 1¾″	.042	.066	.095	.129	.168	.213	.263	.318	.378	.444	.515	.788	.525
36x20x36	16′- 3″	16′- 4⅝″	.304	.475	.684	.930	1.21	1.54	1.90	2.30	2.73	3.21	3.72	2.42	.520
36x18x36	15′- 9¾″	15′-11⅜″	.622	.972	1.40	1.90	2.49	3.15	3.89	4.70	5.60	6.57	7.62	4.41	.520
42x36x42	18′- 2½″	18′- 6″	.046	.072	.104	.142	.185	.234	.289	.350	.416	.488	.566	.184	.473
42x30x42	17′- 8″	17′- 9¾″	.006	.010	.014	.019	.024	.031	.038	.046	.055	.064	.074	.517	.469
42x24x42	17′- 0″	17′- 1¾″	.286	.447	.644	.877	1.14	1.45	1.79	2.16	2.58	3.02	3.51	2.25	.460
48x42x48	19′- 3¼″	19′- 5⅜″	.040	.062	.089	.121	.158	.200	.247	.299	.356	.417	.484	.168	.415
48x36x48	18′- 2½″	18′- 6″	.004	.007	.010	.014	.018	.023	.028	.034	.040	.047	.055	.380	.408
48x30x48	17′- 8″	17′- 9¾″	.149	.232	.335	.456	.595	.753	.930	1.12	1.34	1.57	1.82	1.33	.400
48x24x48	17′- 0″	17′- 1¾″	.924	1.44	2.08	2.83	3.70	4.68	5.78	7.00	8.32	9.77	11.3	6.18	.400

The small diameter in each assembly indicates Rotovalve size. Loss or Saving Tables shown apply only to the 125# Flange Assemblies.

LOSSES BASED ON STEEL TAPERED SECTIONS HAVING THE SAME LAYING LENGTHS AS A.W.W.A. LONG PATTERN REDUCERS AND INCREASERS.

VALVE SIZES

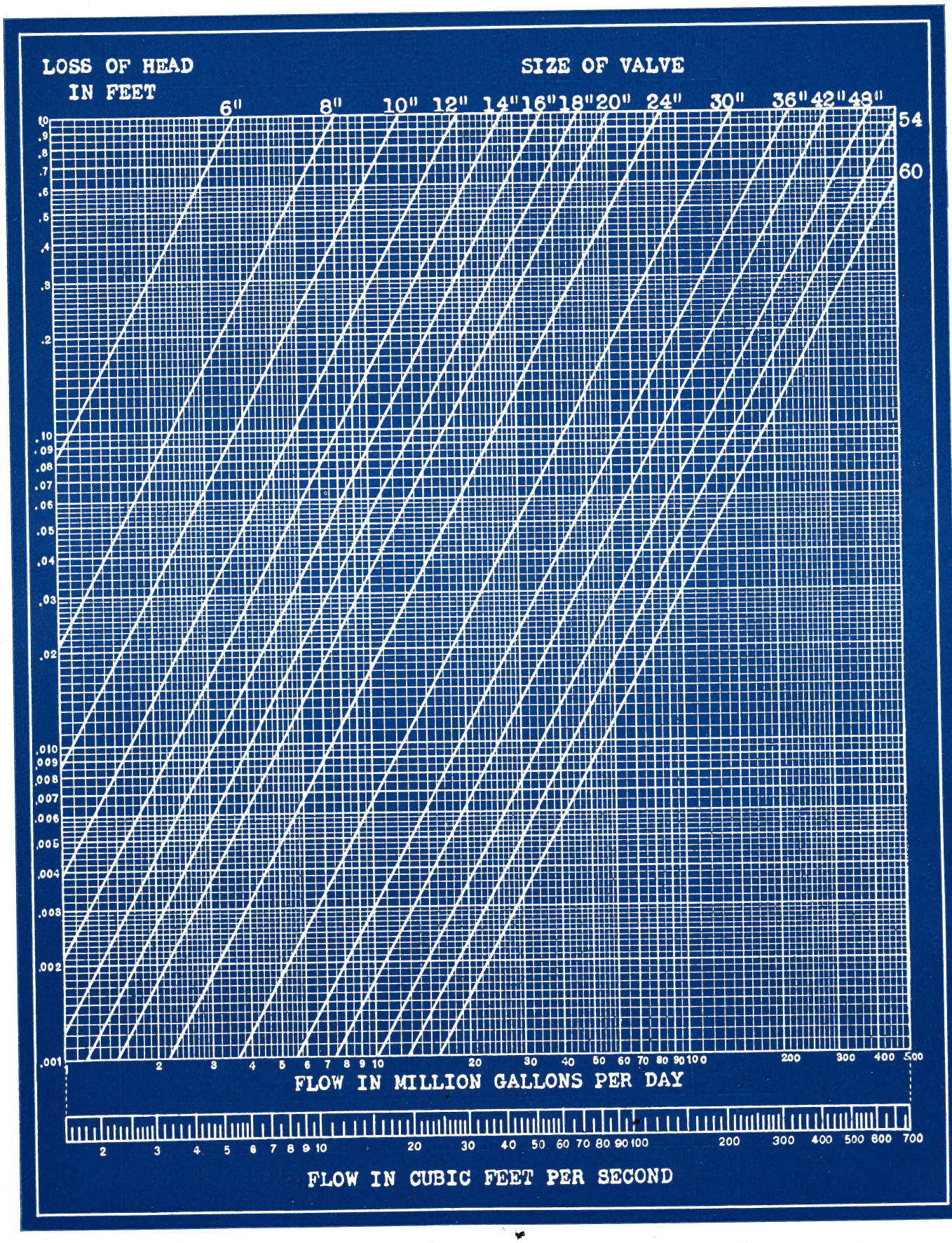
Millions of Gallons per 24 Hours	4″	6″	8″	10″	12″	14″	16″	18″	20″	24″	30″	36″	42″	48″	54″	60″	72″	84″
.05	0.88	0.39	0.22															
.06	1.07	0.47	0.27															
.07	1.26	0.55	0.31	0.20														
.08	1.45	0.63	0.36	0.23														
.09	1.61	0.71	0.40	0.25	0.18													
.10	1.78	0.79	0.44	0.28	0.20	0.15	0.11	0.09	0.07									
.11	1.96	0.87	0.49	0.31	0.22	0.16	0.12	0.10	0.08									
.12	2.15	0.95	0.54	0.34	0.24	0.17	0.13	0.10	0.09									
.13	2.30	1.02	0.58	0.37	0.26	0.19	0.15	0.11	0.09									
.14	2.49	1.10	0.62	0.40	0.28	0.20	0.16	0.12	0.10									
.15	2.67	1.18	0.67	0.43	0.30	0.22	0.17	0.13	0.11									
.20	3.56	1.58	0.89	0.57	0.39	0.29	0.22	0.17	0.14	0.10	0.06							
.30	5.34	2.36	1.33	0.85	0.59	0.43	0.33	0.26	0.21	0.15	0.10							
.40	7.12	3.15	1.77	1.13	0.79	0.58	0.44	0.35	0.28	0.20	0.13	0.09						
.50	8.80	3.94	2.22	1.42	0.99	0.72	0.55	0.44	0.35	0.25	0.16	0.11						
.60	10.70	4.73	2.66	1.70	1.18	0.87	0.66	0.52	0.43	0.30	0.19	0.13						
.70	12.60	5.52	3.10	1.99	1.38	1.01	0.77	0.61	0.50	0.35	0.22	0.15						
.80	14.50	6.30	3.55	2.27	1.58	1.16	0.88	0.70	0.57	0.39	0.25	0.18						
.90	16.10	7.09	3.99	2.55	1.77	1.30	0.99	0.79	0.64	0.44	0.28	0.20						
1.00	17.80	7.88	4.43	2.84	1.97	1.45	1.11	0.88	0.71	0.49	0.32	0.22	0.16	0.12	0.10	0.08	0.06	0.04
2.00	35.60	15.76	8.86	5.67	3.94	2.90	2.22	1.75	1.42	0.98	0.63	0.44	0.32	0.24	0.19	0.16	0.11	0.08
3.00	53.40	23.64	13.30	8.51	5.91	4.35	3.33	2.63	2.13	1.48	0.95	0.66	0.48	0.36	0.29	0.24	0.16	0.12
4.00	71.20	31.52	17.72	11.35	7.88	5.79	4.43	3.50	2.84	1.97	1.26	0.88	0.64	0.49	0.39	0.32	0.22	0.16
5.00	88.00	39.40	22.16	14.18	9.85	7.24	5.54	4.38	3.55	2.46	1.58	1.09	0.80	0.62	0.49	0.40	0.27	0.20
10.00		78.80	44.30	28.36	19.70	14.48	11.08	8.76	7.09	4.92	3.15	2.19	1.61	1.23	0.97	0.79	0.55	0.40
20.00			88.60	56.12	39.40	28.96	22.16	17.50	14.18	9.85	6.30	4.38	3.22	2.46	1.95	1.58	1.09	0.80
30.00				85.18	59.10	43.48	33.24	26.26	21.27	14.77	9.46	6.57	4.82	3.69	2.92	2.36	1.64	1.21
40.00					78.80	57.92	44.32	35.00	28.36	19.70	12.61	8.76	6.45	4.92	3.89	3.15	2.19	1.61
50.00						72.40	55.40	43.76	35.45	24.62	15.75	10.95	8.04	6.16	4.86	3.94	2.74	2.01
100.00								87.52	70.90	49.24	31.50	21.90	16.08	12.31	9.73	7.88	5.47	4.02
200.00											63.00	43.80	32.16	24.62	19.46	15.76	10.94	8.04

VELOCITY IN FEET PER SECOND
THROUGH PIPE OR ROTOVALVES.

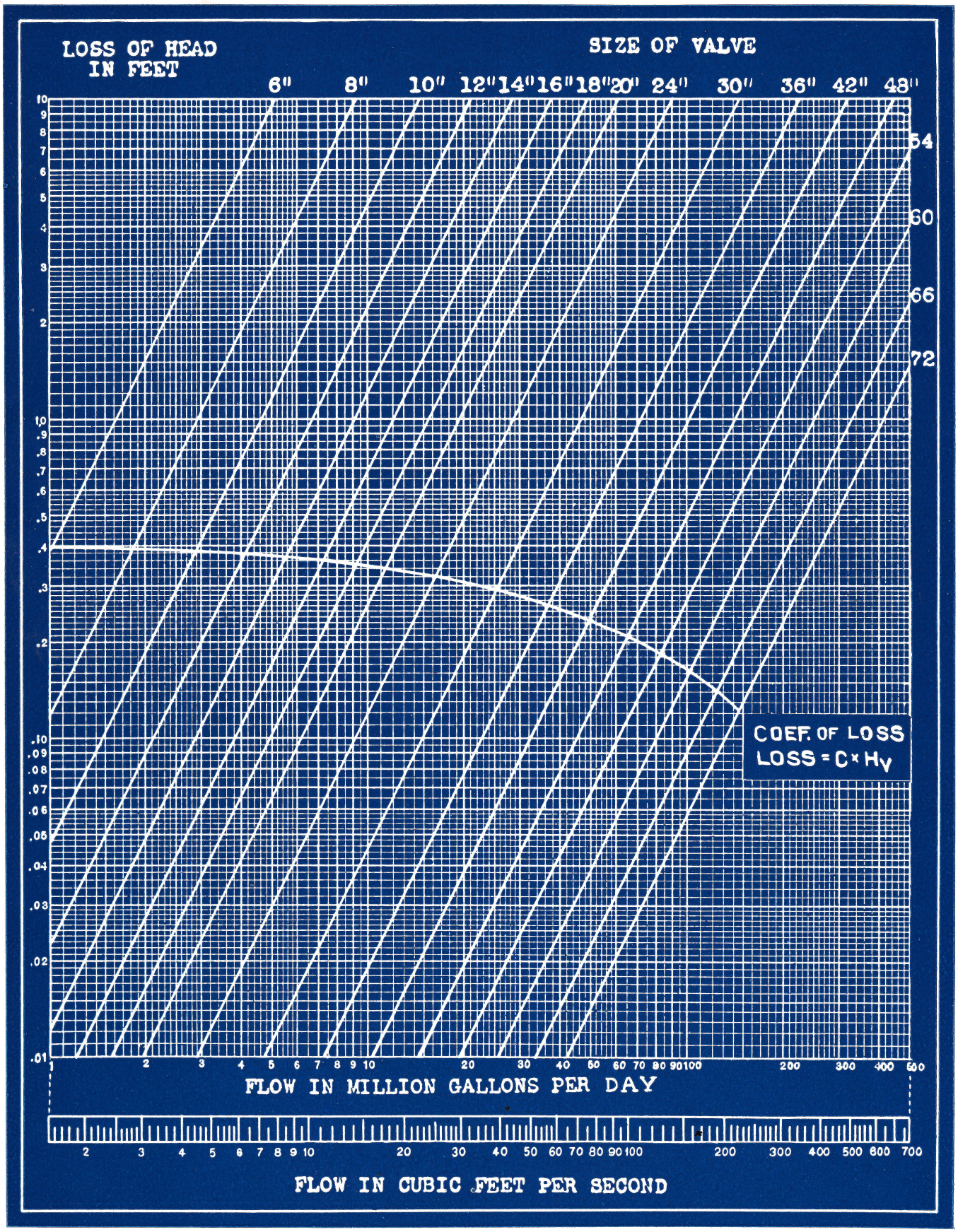
DISCHARGE IN CUBIC FEET PER SECOND

CALCULATED DISCHARGE THROUGH ROTOVALVES
BASED ON VALVE CAPACITIES ONLY.

NET HEAD AT ORIFICE		Velocity of Discharge In Feet per Second																	
Lbs.	Feet		6″	8″	10″	12″	14″	16″	18″	20″	24″	30″	36″	42″	48″	54″	60″	72″	84″	96″
10	23.1	38.58	7.57	13.47	21.0	30.30	41.1	53.8	68.2	84.2	122	190	273	370	484	613	755	1089	1489	1935
15	34.7	47.25	9.25	16.50	25.8	37.08	50.2	65.2	83.6	103.1	148	232	336	453	593	750	923	1332	1838	2367
20	46.2	54.55	10.70	19.03	29.8	42.75	58.1	75.4	96.7	119.0	170	269	385	524	685	869	1064	1537	2103	2742
25	57.8	60.99	11.86	21.33	33.2	47.8	65.0	84.2	108.0	133.0	191	299	430	585	765	969	1188	1719	2353	3060
30	69.3	66.82	13.10	23.35	36.6	52.5	71.5	92.4	118.9	145.9	210	329	472	642	841	1070	1313	1905	2605	3388
35	80.9	72.16	14.13	25.15	39.3	56.7	76.9	99.5	128.0	155.8	226	354	508	692	905	1145	1408	2101	2787	3605
40	92.4	77.14	15.12	27.00	42.2	60.5	82.3	106.5	137.0	167.8	242	378	543	740	969	1228	1505	2177	2980	3879
45	104.0	81.83	16.04	28.60	44.6	64.3	87.2	112.8	143.2	177.9	256	402	577	786	1046	1305	1613	2313	3161	4101
50	115.5	86.26	16.90	30.10	47.0	67.8	92.0	120.8	153.1	187.9	271	422	609	828	1084	1372	1699	2434	3332	4323
55	127.1	90.46	17.72	31.55	49.3	71.0	96.5	125.1	160.2	197.0	284	443	638	868	1134	1437	1780	2547	3480	4535
60	138.6	94.49	18.53	32.90	51.6	74.2	100.0	132.0	167.5	206.0	297	463	660	906	1189	1502	1859	2667	3646	4737
65	150.2	98.35	19.27	34.22	53.7	76.1	104.2	137.0	174.0	214.0	309	483	694	944	1232	1564	1939	2769	3798	4940
70	161.7	102.06	20.00	35.62	55.7	80.1	108.2	141.9	181.0	222.0	320	501	720	978	1281	1626	2010	2879	3939	5121
75	173.3	105.65	20.72	36.85	57.7	83.0	111.8	147.5	187.1	231.0	331	518	745	1013	1326	1677	2081	2980	4070	5276
80	184.8	109.11	21.40	38.08	59.6	85.7	115.4	152.6	191.3	238.0	343	536	770	1048	1363	1735	2149	3080	4210	5475
85	196.4	112.46	22.20	39.20	61.3	88.3	118.8	157.2	199.2	245.0	354	558	793	1081	1409	1788	2217	3170	4345	5635
90	207.9	115.72	22.62	40.30	62.8	90.6	124.0	161.2	203.2	252.0	363	572	815	1110	1450	1838	2275	3250	4465	5800
95	219.5	118.89	23.35	41.50	64.8	93.3	125.6	166.0	210.8	258.0	373	584	839	1130	1492	1889	2370	3355	4575	5970



LOSS OF HEAD THROUGH ROTOVALVES.


LOSS OF HEAD IN FEET
SIZE OF VALVE
6" 8" 10" 12" 14" 16" 18" 20" 24" 30" 36" 42" 48"
54
60
66
72
COEF. OF LOSS
LOSS = C × Hv
FLOW IN MILLION GALLONS PER DAY
FLOW IN CUBIC FEET PER SECOND

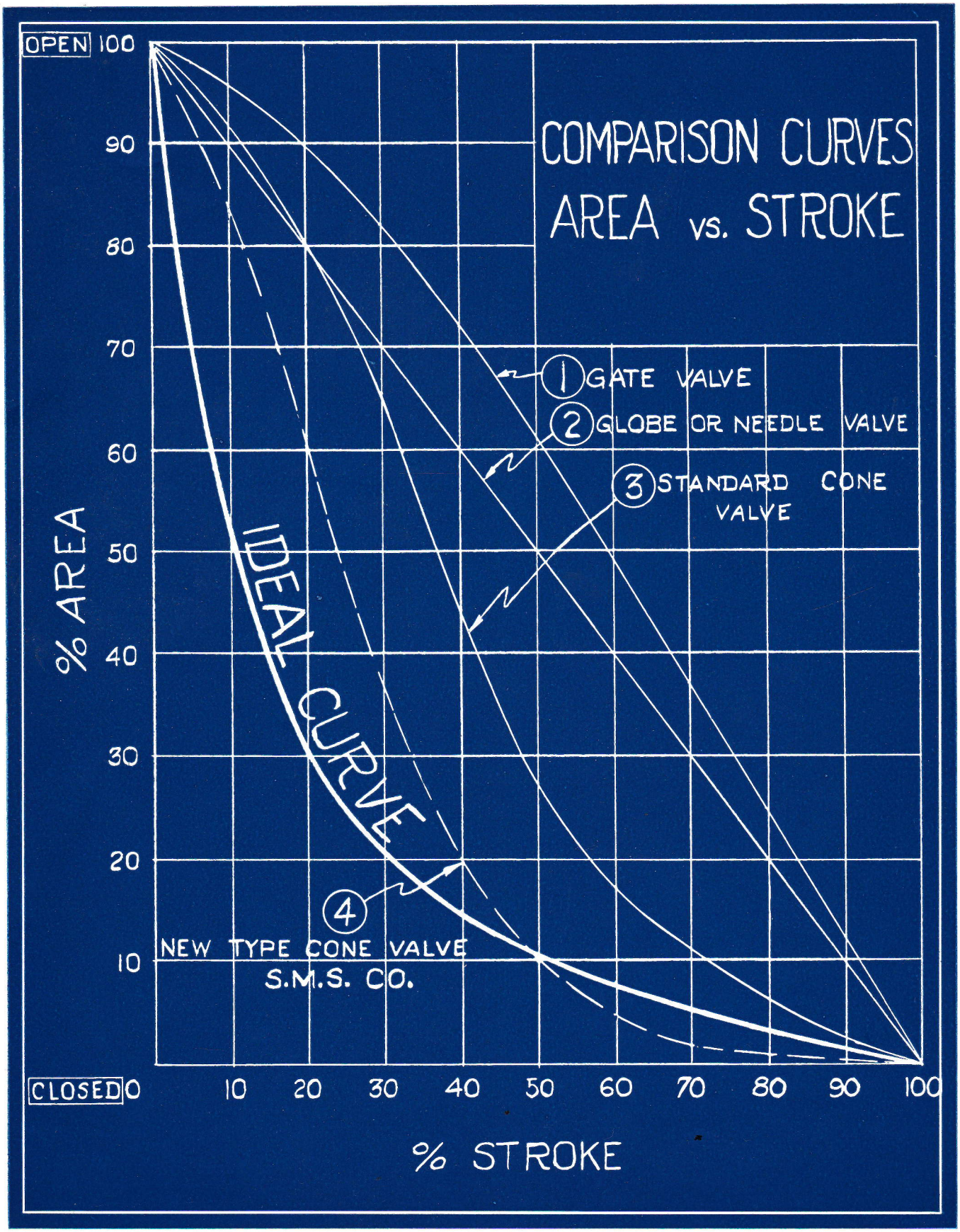
LOSS OF HEAD THROUGH GATE VALVES.

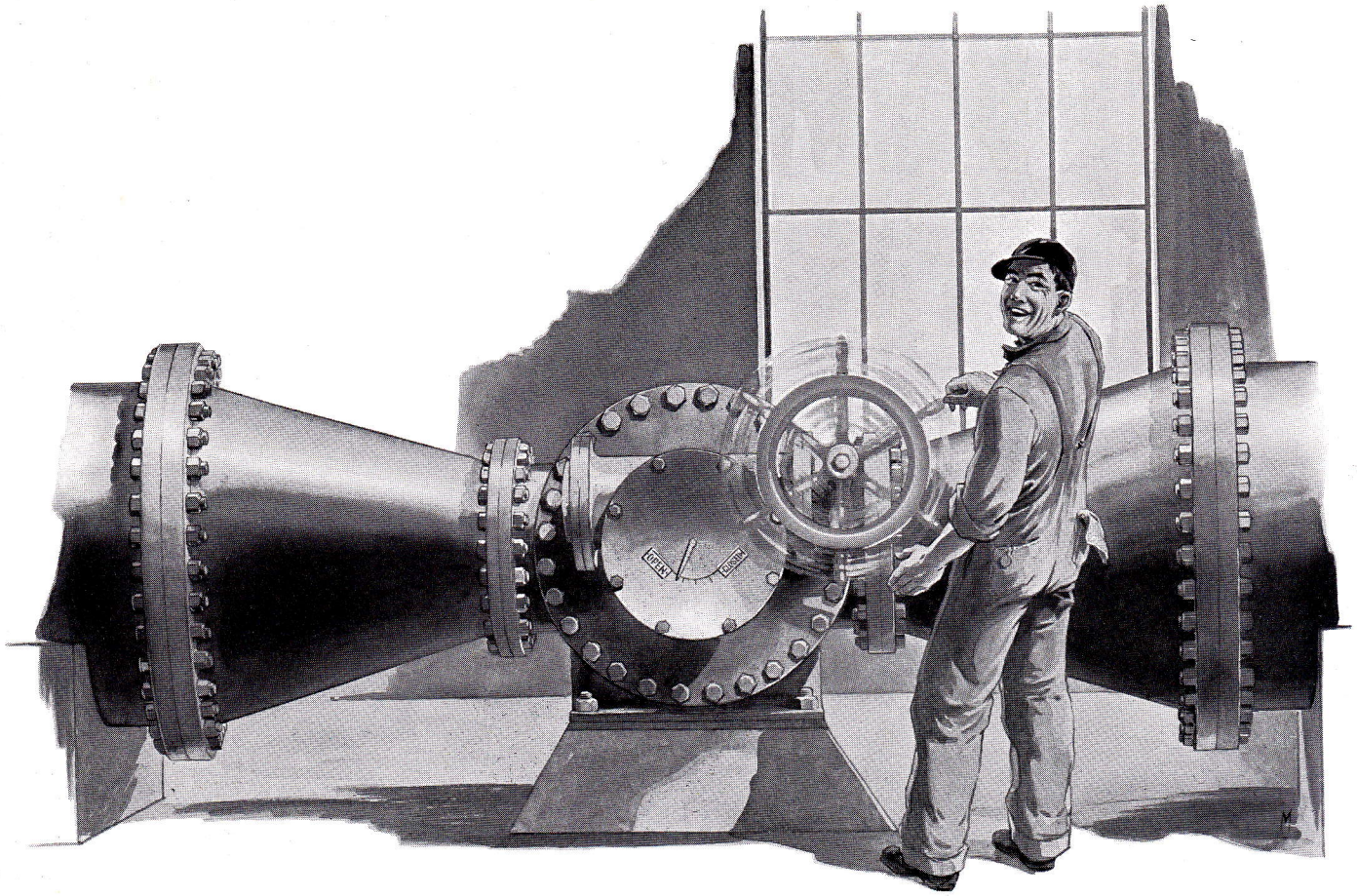
Variable Closure

WITH the development of cone valves and the great diversity of their application, the need for a means of varying the rate of area cut-off in flow control was discovered.

In answer to this need, we have developed a mechanism now incorporated in all Rotovalves through which "Variable Closure" is accomplished. A fixed rate of valve stem movement automatically causes a variable rate of area cut-off. The result of this improvement creates a characteristic of flow control which materially reduces the possibility of excess pressure rise and further assists in the reduction of water hammer.

By changing the operating mechanism of the standard ROTOVALVE, cut-off characteristics as shown on page 19 are obtained. Curve 4 clearly illustrates the result of this mechanical improvement when comparison is made between this curve, the Ideal Curve, and those of other types of valves. The Ideal Curve was developed from extensive field tests. Approximately 100 individual test runs, covering various hydraulic conditions in long lines, were made.


COMPARISON CURVES
AREA vs. STROKE
OPEN
CLOSED
100
90
80
70
60
50
40
30
20
10
0
% AREA
10
20
30
40
50
60
70
80
90
100
% STROKE
IDEAL CURVE
1 GATE VALVE
2 GLOBE OR NEEDLE VALVE
3 STANDARD CONE VALVE
4 NEW TYPE CONE VALVE
S.M.S. CO.



Bulletin No. 143

S. MORGAN SMITH COMPANY

YORK, PENNSYLVANIA

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